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AUTHOR Welch, Mary A., Ed.
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ABSTRACT

This booklet focuses on the economic concept of "value added" to goods and services. A student activity worksheet illustrates how the steps involved in processing food are examples of the concept of value added. The booklet further links food processing to the idea of value added to the Gross National Product (GNP). Discussion questions, a student activity, and information about businesses and careers are included. (EH)

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for Food, Agriculture, & Natural Resources

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INTRODUCTION

FOOD—along with water and shelter—is a basic human need. In industrialized economies, a large percent of the population live and work in non-rural areas. As a result, people no longer grow their own food, and with the increasing percentage of women working outside the home, consumers are causing a “food revolution.” Consumers are paying for convenience. More work is done by processors to allow for minimal or no preparation in the home. By processing raw food materials into finished, consumer-ready foods, industries are *adding value* to many items available on grocery store shelves.

TEACHING ACTIVITIES

- How food processing illustrates the concept of **economic value added**.
- Use food processing to link the idea of **value added** to the Gross National Product (GNP).

STUDENT GOALS

1. Students calculate **value added** in each step of processing a specific product.
2. Students learn how to calculate GNP by using the example of adding value to raw food materials.
3. Students recognize that jobs and wealth are created from **value added** processing of food.
4. (Optional) Students compare results learned from processing of one food item to other foods.

WHAT DEFINES VALUE ADDED IN THE FOOD INDUSTRY?

Food processors take raw animal, vegetable, or marine materials and transform them into edible products through the application of labor, machinery, energy, and scientific knowledge. Chemical, biological, and mechanical processes are used to convert relatively bulky, perishable, and often raw materials into long-lasting, convenient, and palatable foods and beverages. Utilizing factory systems and business management, processors add economic value by transforming products grown on farms, raised on ranches, or fished from the sea. Wheat becomes bread; cattle, frozen beef stew; soybeans, mayonnaise; and corn, soft drinks (high-fructose corn syrup is the primary sweetener in soft drinks).

ADDING ECONOMIC VALUE

Processing enhances the usefulness of farm products in many respects. How? Preserving (freezing, canning, drying) allows products to be stored longer while containers and packaging protect contents. Usually, processors concentrate a product (remove air, water, or inedible parts) to reduce transportation and packaging costs. Shipping water around the country is costly and cumbersome; water is heavy and can easily be added in home preparation. Increasing palatability (flavor), storability (long shelf-life), portability (easily moved) and convenience are all aspects of adding value. In addition, processors must procure all the right ingredients and materials needed in advance, maintain inventories of inputs and finished goods, test products, develop new products, and arrange for distribution to grocery stores, restaurants and other retail outlets. These are also aspects of adding value.

HOGS...PORK...SAUSAGE...PIZZA...

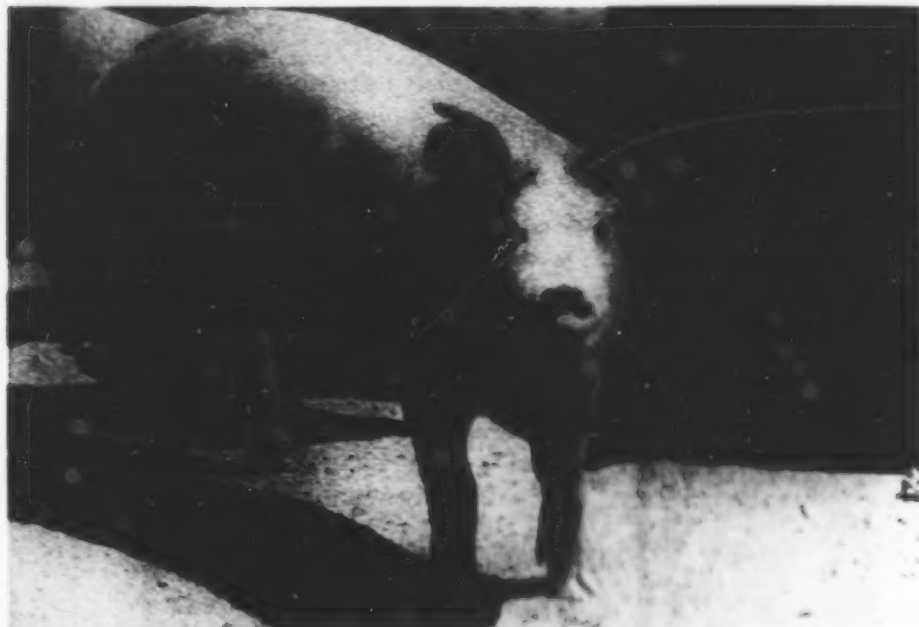
How is each of the following related to the term preceding it? 0) piglet, 1) 200-pound hog, 2) side of pork, 3) pork chunks, 4) ground pork, 5) frozen bulk sausage, 6) smoked or linked sausage, and 7) sausage pizza? In terms of food processing, each of these (in sequence) is more highly processed. Each process adds value to the 200-pound hog the farmer sells to a market. Each time a product goes through a physical change, the end product increases in cost.

To illustrate this concept, let's see what happens to the hog after an Indiana farmer sells it to the market:

Value is added by the farmer in feeding it from piglet to market size. Value is further added by the broker or agent who purchases several hundred hogs from farmers and sends them to a central location (like Chicago), where one meatpacking plant buys hogs by the thousands each day. Even though the hog has not yet been processed, gathering or

collecting locations and the cost of shipping have already put a higher price on each hog.

That's only the first step. The live hog goes in one end of a meat-packing plant and a box of chilled pork comes out the other. The meat-packer sells the pieces of pork to a sausage maker at almost double the price per pound of the live hog. In the sausage plant, the tougher cuts of pork are ground and cooked with added flavorings. A few days later, the sausage is shipped frozen in a truck to a Milwaukee pizza maker; this buyer gladly pays double the cost of fresh pork to have a nicely flavored topping. Finally, some flour, tomato sauce, cheese, and sausage are baked, quick-frozen, wrapped, and several cases of pizza are sold to a grocery store in Green Bay, Wisconsin or Indianapolis, Indiana. Consumers pay \$2.50 for each large sausage pizza.



VALUE ADDED APPROACH TO CALCULATING GNP

Gross National Product (GNP) is the total value of all final goods and services sold by all companies of a given country. GNP also shows up as an equal amount of income to workers and owners.

Below are (6) different stages necessary for the production of 100 large Gracestone's frozen pizzas. It takes the meat of one hog to make enough sausage for 100 large sausage pizzas. If these data were taken from a nation whose entire GNP consisted of the value of these hogs, show how GNP could be calculated three different ways by completing the table.

Production stage (seller to buyer)	Cost to buyer	Income for seller	Value added	Purchased for final use
1. Farmer to hog broker	\$ 60	_____	_____	_____
2. Broker to meatpacker	\$ 70	_____	_____	_____
3. Meatpacker to sausage maker	\$100	_____	_____	_____
4. Sausage maker to pizza manufacturer	\$120	_____	_____	_____
5. Pizza maker to grocery stores	\$200	_____	_____	_____
6. Grocery stores to households	\$250	_____	_____	_____

A meatpacker adds value by slaughtering hogs and cutting the meat into pieces which can be sold directly to other processors, grocers, or restaurants. The price of this meat carries the cost of slaughter, cutting, refrigeration/freezing, sorting, packaging, and delivery. More value can be added by trimming fat (lean pork). This is important in today's health conscious society.



Why would 50-pound packages typically be cheaper per pound than 3-pound packages? What costs are not incurred by selling bulk sausage?...labor, machine-time, plastic wrap, a cardboard box. In this form, chunks of pork could be used for stews, casseroles, stir-fry dishes, or they could be purchased by a frozen pizza company to process into sausage for making sausage pizzas; added value.

NOTE: The consumer is the final purchaser who uses, or in this case, eats the product. The consumer is only the last of several buyers in a chain going back to the Indiana farmer.

The pizza manufacturer or restaurant now must procure (purchase/acquire) all the necessary ingredients to produce pizzas: crust mix or already-prepared and rolled dough, tomato sauce, cheeses, vegetables, spices, cardboard or aluminum forms for underlining, plastic wrap, labels, and of course, don't forget sausage. If the pizza is partially baked, it must then be quickly frozen. The convenience of baking only 10 rather than 35 minutes during final preparation again added value.

NOTE: Consumers could purchase sausage, flour, tomato sauce, and cheese to make a pizza in their own kitchens, thus saving processing, storage, and overhead costs. The consumer must ask, "How much am I willing to pay in time and effort to make a 'scratch' pizza?"

Once the pizzas are made, several economic factors must be analyzed before distribution begins. Consideration of regional consumer preference, method of transportation, and means of financing are among these factors. Refrigerated or frozen storage to accommodate these considerations can add considerable cost or value to the pizzas.

How is this value measured?

Economists measure **value added** by computing the difference between the value of shipments and the costs of purchased inputs. That is the contribution of a company to its industry's **value added**. The **value added** of all industries is GNP.

Value added also contributes to National Income in the form of payments to labor, owners of capital, and management dedicated to production in a plant, company, or industry.

In the nondurable goods category, the percent of personal consumption expended on food and beverages **decreased** the most, 14.1% from 1947 to 1985. While durable goods increased some (with the exception of furniture), the services sector **increased** the most at 20.2% during the same time period.

In 1985, the food processing industry generated \$104 billion in **value added** or 10.4% of the **value added** by the whole manufacturing sector. The food industry ranks third among the twenty major manufacturing groups in terms of **value added**, slightly below the electrical and non-electrical machinery industry groups.

GENERAL QUESTIONS TO CONSIDER.

1. How and what jobs are created by value added processes in the food industry?

The process of adding value to food increases the number of jobs. More convenient foods add further value. Individuals are needed to create and develop new food products to meet the increasing demand for convenience, to purchase raw materials and supplies, to schedule continuous flow of materials to processors, to arrange for and supervise personnel, to arrange for and purchase transportation of raw and processed materials, to design marketing and sales plans, to track cost of processing and study efficiency of operations, to obtain financing, acquire land and contracting services and to engineer and build processing plants and restaurants.

You can probably name others.

2. Do you think that consumers spent more on food away from home (restaurants) in 1985 than in 1947?

There are two ways this question could be answered.

Yes, because incomes went up, real spending on away-from-home food did rise.

No, incomes increased but expenditures on both food at home and in restaurants did not increase proportionally (only 5-6%). The food dollar (percent of income spent for food) actually decreased during that time, from almost one-third to only one-sixth of household expenditures.

3. Why have food expenditures become relatively smaller over time?

- More efficient processing plants?
- Labor-saving equipment?
- Workers among the poorest paid in manufacturing?

4. Which of the following incurred costs would add value to the frozen pizza in our example?

- A. Trucking fees
- B. Using more expensive aluminum pans instead of cardboard
- C. Quality-testing of products
- D. Making a microwavable version
- E. All of the above
- F. None of the above

5. Even though the population of farm employees has declined, the number of people who work in the food industry has increased. How can this best be explained?

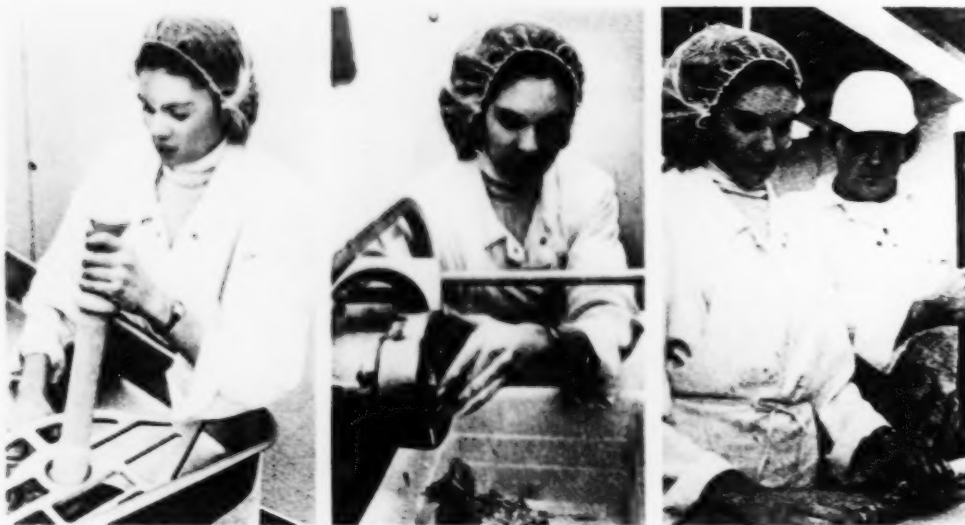
No longer is food grown, processed and prepared in one location by the same people. Jobs are created in the entire chain of the food cycle: processing, wholesaling, retailing, transportation,

and restaurant workers. Also, much of the value added by farmers has moved to other stages of the food system.

6. In our example of calculating GNP, give examples of incurred costs from one stage of supplier to the next. Can you add to the list of these costs?
 1. **Farmer to hog broker** — trucking costs, salary of buyer at collecting station,
 2. **Broker to meatpacker** — trucking costs,
 3. **Meatpacker to sausage maker** — paying meatcutters, building meatpacking plants,
 4. **Sausage maker to pizza manufacturer** — energy to cook meat,
 5. **Pizza maker to grocery stores** — cost of freezing ingredients,
 6. **Grocery stores to households** — cost of storage, wages of clerks to price and put items on shelves,

Student Activity

Price ingredients for preparing a "from-scratch" pizza using more highly processed ingredients; for example, refrigerated dough versus low-processed ingredients (flour, yeast, salt, shortening).





Production stage (seller to buyer)	Cost to buyer	Income for seller	Value added	Purchased for final use
1. Farmer to hog broker*	\$ 60	60	60	0
2. Broker to meatpacker	\$ 70	10	10	0
3. Meatpacker to sausage maker	\$100	30	30	0
4. Sausage maker to pizza manufacturer	\$120	20	20	0
5. Pizza maker to grocery stores	\$200	80	80	0
6. Grocery stores to households	\$250	50	50	250
TOTAL		250	250	250 GNP

*Note — for purposes of this illustration, we assume that the hog farmer buys no inputs from off the farm. This is unrealistic, of course, because most farmers buy machinery, feed, electricity, building materials which are off-the-farm cost

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John Connor is a professor in the School of Agriculture at Purdue University. He is available to come to your classroom to discuss this topic at *no cost to you* as part of *Professors in the Classroom*. If you would like more information about this program, please call Marlaya Wyncott (317) 494-9849.



BUSINESS

If you like business, you should consider a career in food, agriculture, and natural resources. Purdue University offers one of the nation's best programs to prepare you for a business management career in our food and natural resource system.

Consider these items:

- Above average salaries and career opportunities are available for agribusiness graduates. You can be in a strong position for success with professional preparation in business and agriculture.
- Food is a basic and strategic product. With world-wide population expansion, business opportunities in food, agriculture, and natural resource management will continue to grow.
- Agribusiness is international business. Our food system is important in the international market and is strongly affected by world-wide economic conditions.
- Agribusiness is dynamic. Professionals in agribusiness develop and use the latest technology and information to provide food and fiber efficiently while maintaining our natural resources.

CAREERS

Business graduates in food, agriculture, and natural resources are important professionals. You can become a **financial manager, market analyst, sales representative, broker, business manager, or banker.**

Agribusiness graduates are **systems analysts, farm managers, forest managers, and business consultants.** You can work for farm supply distributors, grain companies, computer distributors, agrichemical firms, and banks.

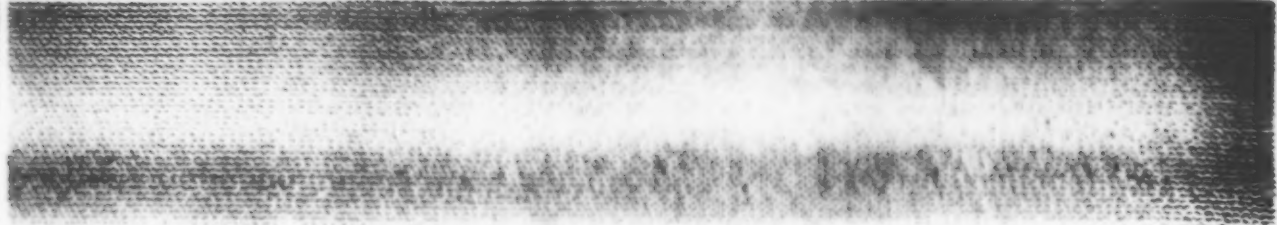
Perhaps you would like to work for a farm machinery company, farm management firm, pulp and paper company, stock and commodity broker, timber company, food manufacturer, governmental agency, lawn and garden center, public utility, feed company, seed company, or pharmaceutical firm.

YOU can have a challenging business career in the U.S. food and natural resources system.

To get more information about food, agricultural, and natural resources business management programs of study at Purdue University, write to:

Dr. Karl Brandt, Associate Dean
Director of Academic Programs
School of Agriculture
Purdue University
1140 Agricultural Administration Building
West Lafayette, IN 47907-1140

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